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technical note:

SUPPLEMENTARY DATA ON MARK II LIGHTWEIGHT PREFABRICATED PORTABLE WANIGAN

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INTRODUCTION

This technical note includes (1) supplementary data on the manner and method of sealing the panel joints in the Mark II, lightweight, prefabricated, portable wanigan, (2) additional information on movement between the panels when the wanigan is underway and (3) various methods of securing the wanigan to the carrier sled.

The prototype wanigan, as originally constructed and tested, is described in a report entitled "Construction and Test of a Lightweight, Prefabricated, Portable Wanigan"[1]. In order to determine the structural adequacy of the individual wanigan parts, additional tests were made and evaluated in a supplementary report entitled "Mark II Lightweight, Prefabricated, Portable Wanigan, Trail Tests Over Simulated Arctic Terrain"[2]. To augment the data contained in the supplementary report, additional tests were authorized under Project NY-013 02B-2 by the Bureau of Yards and Docks.

The tests performed included determination of the compressive strength of the rubber-gasket joint sealer, measurement of tension in the wanigan tie-rods when under load, and rain tests to ascertain the extent of leakage with the transverse inter-panel joint spacing compressed to the 1/4-in. clearance shown on Bureau of Yards and Docks Drawing No. 468,608.

JOINT SEALING

The first supplementary report[2] states that, in compression tests on strips of the rubber gasket joint sealer, a unit force of 20.8 lbs was required to compress each lineal inch of gasket to a thickness of 1/4-in. A review of the original data shows that this unit force, 20.8 lbs, was required to compress a lineal inch of panel joint or, since there are two gaskets in a joint, two lineal inches of gasket. Additional compression tests made in October 1950 found that in 33 tests an average unit force of 27.6 lbs per lineal inch of panel joint was required to compress the joints to 1/4-in. Results of the individual tests are given in Table 1.

Compression tests on the panel joints in the assembled wanigan were made using the assembly harness[1] modified by replacing for test purposes the four 3/8-in. diameter longitudinal rods used in the original harness with 1-in. diameter rods. Further, these 1-in. rods were equipped with SR-4 electrical strain gages in order to observe the tension in

each rod when the transverse panel joints were clinched to 1/4-in. as shown in Figure 1. Buckling of the lightweight plywood panel skins permitted irregularities in the joints, and a uniform 1/4-in. joint width was not obtained. This lack of uniformity in the panel joints resulted in a variance in the tension in the four longitudinal tie-rods. The recorded tensions with an average joint width of 1/4-in. were 2223 lbs, 2340 lbs, 1989 lbs, and 3463 lbs giving an average tension for each rod of 2504 lbs.

In the simulated rain test with the joints compressed to an average width of 1/4-in., leakage was observed in the ceiling around the knee braces. This leakage was attributed in part to the buckling of the plywood panel skins resulting in distortion of the panel frames and in part to the presence of the knee braces in the joints.

PANEL MOVEMENT

Shifting between panels when the wanigan is underway was measured in simulated Arctic trail tests, and the results are in the first supplementary report[2]. To augment the information included in that report Figure 2 has been included to show the location of the match lines used to measure the movement. Further, the maximum amount of movement at each location is shown and, as indicated by the plus and minus signs, the movement between the match lines can be in either direction.

TIE DOWN METHODS

Three methods of securing the wanigan to the sled deck have been considered in these tests, namely, steel strap tie-downs, lag screws through the wanigan floor to the sled deck, and a 12-in. high, guard rail fitted into the stake pockets on the sled. In the tests conducted on the Mark II wanigan, the steel strap tie-down method was used exclusively with satisfactory results[2]. Tests of the other methods under simulated Arctic trail conditions were not considered warranted; however, all three methods have been incorporated in testing the Mark III wanigan, as authorized under Project NY-013 02B-3, at Pt. Barrow, Alaska during the 1950-51 season. Results of these tests will be included in reports on that project.

CONCLUSIONS

Compression of the transverse panel joints to 1/4-in. by means of the tie-rod harness did not entirely stop leakage of water into a wanigan subjected to a simulated rain; however, this leakage was materially reduced over that observed in previous tests[2], where the panel joints were not

cinched up to 1/4-in. Stiffening of the panels to prevent buckling when sufficient compression is applied to cinch up the joints should eliminate the leakage.

In a prefabricated panel-type wanigan employing the gasket material, with a unit compressive force of 27.6 lbs per lineal inch of joint, computations indicate that a tie-rod harness employing four 5/8-in. diameter longitudinal steel tie-rods would prove satisfactory for cinching the panel joints and holding them in place.

Further development and testing of lightweight, portable wanigans and component parts will be processed under Project NY-013 02B-3. This supplementary report, therefore, concludes work on this project.

REFERENCES

1. Naval Advanced Base Proving Ground, Construction Battalion Center, Port Hueneme, California, report Construction and Test of a Lightweight, Prefabricated, Portable Wanigan, 5 May 1949.

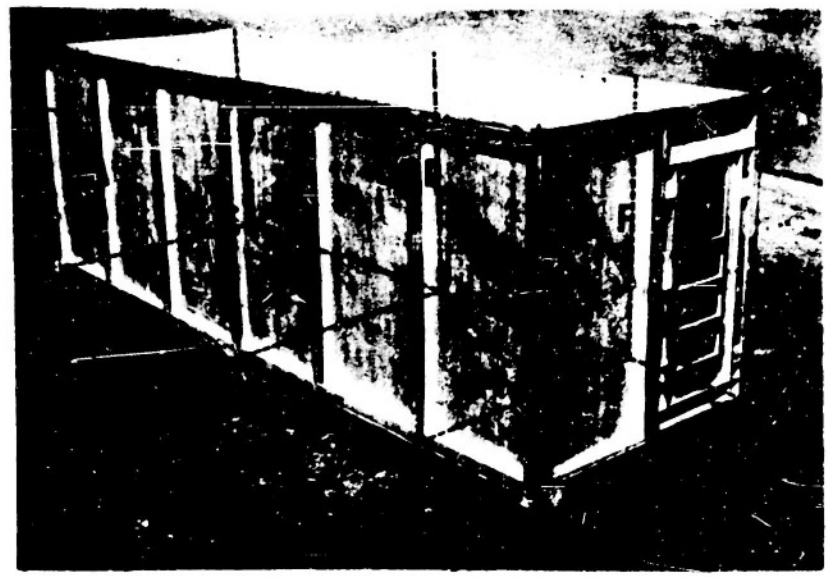
2. Naval Advanced Base Proving Ground, Construction Battalion Center, Port Hueneme, California, report Mark II, Lightweight, Prefabricated, Portable Wanigan, Trail Tests Over Simulated Arctic Terrain, Supplementary Report No. 1, 14 October 1949.

Table 1. Compressive Tests on Strips of Rubber Gasket Material Used as Sealer between Panel Joints.

Unit force shown is amount required to compress gasket to 1/4-in. thickness.

Test No.	Unit Force lbs/lin-in.	Test No.	Unit Force lbs/lin-in.
One strip of gasket			
1	12.5	14	13.5
2	11.5	15	16.0
3	13.0	16	14.0
4	11.5	17	15.5
5	13.5	18	15.0
6	13.0	19	14.5
7	12.0	20	11.0
8	12.5	21	16.0
9	11.0	22	15.5
10	14.5	23	16.0
11	14.0	24	16.0
12	12.5	25	15.5
Two strips of gasket (normal panel joint)			
1	26.0	5	26.5
2	26.0	6	27.0
3	28.0	7	26.5
4	26.5	8	30.0

Figure 1. Panel joint compressed to a $\frac{1}{4}$-in. in width. Lower end of one knee brace can be seen immediately above the ruler.



A ± 1/4 in.

B ± 3/16 in.

C ± 1/4 in.

D ± 1/4 in.

E ± 3/16 in.

F ± 1/4 in.

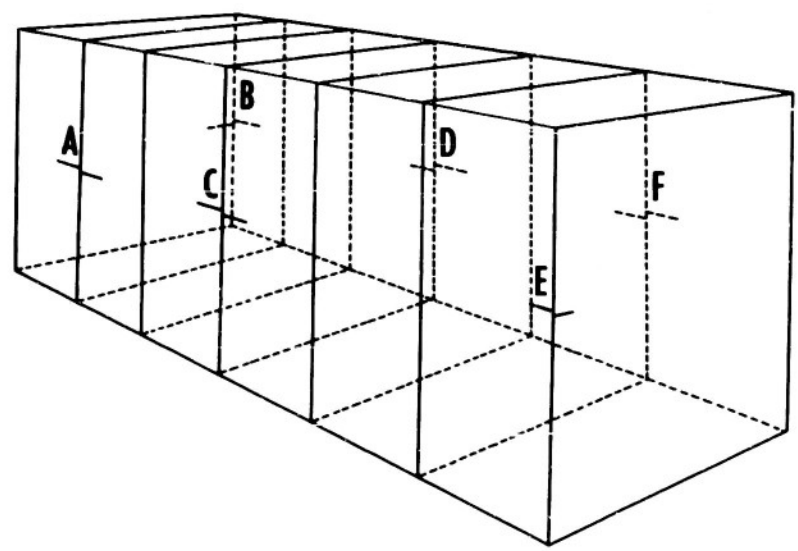


Figure 2. Location of match lines on Wanigan panels. Maximum amount of vertical shifting at each lettered location is shown in the legend.